

parts of caustic potash and methyl alcohol. A clear and colorless liquid, of pleasant odor and sweet, agreeable taste; slightly soluble in water, readily soluble in alcohol and in glycerin. Dose, $\text{m}j-v$ [av. $\text{m}iij$]. If it has color it should be rejected as unsafe by reason of decomposition.

Bromipin (Unofficial),—is a combination of bromine with the fatty acids of Sesame oil, and occurs as a yellowish liquid containing 10 per cent. of Bromine. Dose, ʒj-iv thrice daily, in emulsion, warm milk or capsules.

Incompatibles.

Incompatible with *Bromine* are: Alkali Hydrates, Arsenites, Ferrous salts, Hypophosphites, Hydriodic Acid, Mercurous salts; with *Bromoform* are: Caustic Alkalies, Aqueous liquids; with the *Bromides* are: Acids, Alkaloids, Antimony salts, Bismuth salts, Chlorine-water, Chlorates and Chromates in acid solutions; Salts of Copper, Lead, and Silver; Mercurous salts, Nitric Acid, Spirit of Nitrous Ether if acid.

PHYSIOLOGICAL ACTION.

Bromine is an active and painful escharotic. It sets free ozone, and is therefore antiseptic, disinfectant and deodorant. A solution of 1 in 500 is germicidal in moist air and with an exposure of not less than three hours. Its vapor is irritant to the eyes and the respiratory tract, causing cough, hoarseness and dyspnea. Internally it acts as a corrosive poison, producing violent gastritis, depression, and collapse.

The Bromides are powerful depressants to the nervous system and the circulation, the Potassium salt being the most active in this respect. They lower the activity of the cortical motor area, and that of the brain as a whole, and are powerful hypnotics. The excessive use of Potassium Bromide produces degeneration of the cortical cells, beginning at the periphery of the dendrons. They lower the reflex excitability of the spinal cord, and impair the functions of the peripheral nerves and the sensory apparatus, causing anesthesia of the skin and mucous membranes. They depress the muscular system, by direct action on the muscles themselves, as well as by their action on the nerves supplying them. The Potassium salt is directly paralyzant to the heart, lessening the force and frequency of its contractions, and finally stopping it in diastole. They lower the arterial tension and the body temperature, depress the sexual appetite and power, cause pallor and emaciation, a coated tongue and disordered digestion, a fetid breath, acne on the face and upper extremities, somnolence, dysphagia, sluggish reflexes and defective coördination; and if long continued may even impair the mental faculties, producing hallucinations in some cases, in others melancholia with suicidal tendency; also incompetence of the sphincters and paralysis, beginning at the periphery and extending to the centres. They sometimes cause maniacal excitement, as in the case of a physician who committed suicide in a frenzy caused by bromidizing himself for sea-sickness. The general result of their action is termed *Bromism*, and is heralded by the acne and lowered faucial sensibility. It is probably due to the sedative influence of these agents on the sympathetic system, causing general anemia of the brain, spinal cord, sexual organs, and skin. It is believed that a previous prolonged use of opium or morphine renders the organism extremely susceptible to the action of the bromides.

Bromides are rapidly absorbed and slowly eliminated by the kidneys, skin, saliva, intestinal and bronchial mucous membranes, and the milk. They irritate the mucous membranes at the points of elimination, and increase the quantity of the urine and the excretion of the chlorides and the nitrogenous constituents, but decrease the elimination of the phosphates.

Hydrobromic Acid is more irritant to the stomach than the bromides, but after absorption it has the same action as these agents on the nervous system and the circulation.

Dr. Hammond mentions several cases of fatal bromide-poisoning in one of the last chapters of his treatise on Nervous Diseases, and several cases of poisoning by Potassium Bromide have been published by Dr. Greenless. The first was that of an epileptic who took 75 grains a day for three weeks, when stupor, coma, and extreme prostration and death followed. The *post mortem* showed intense congestion of the meninges. In another case, an epileptic, the same amount of potassium bromide, 75 grains a day, was given, and in ten days coma and death followed. Both the brain and meninges were congested and the kidneys were in the advanced stage of cirrhosis. The other cases were less prominent and clearly resulted from bromism due to long use of the drug. In some cases of inebriety large doses of bromides produce stupor and prostration, from which recovery is slow, and is followed by continued prostration.

Differences in Action between the Bromides.

Potassium Bromide is the most toxic to the heart and the muscular system, and is the least hypnotic. It contains 66 per cent. of Bromine.

Sodium Bromide is the least toxic, but the most hypnotic, and acts more energetically on the circulation. It contains 78 per cent. of Bromine.

Ammonium Bromide resembles the Potassium salt in action, except that it exerts less influence on the heart and on the muscular system, and is somewhat more stimulating.

Lithium Bromide contains the most Bromine, 92 per cent., and resembles the sodium salt in action. It has proved better than the others in some cases of epilepsy, and is by several authorities considered the best hypnotic of the series.

Calcium Bromide is an efficient hypnotic, but otherwise much less active than the other bromides.

Strontium Bromide is said to be less apt than the other bromides to produce the bromic acne and the other results of bromism.

Zinc Bromide, in large doses, is violently irritant. It is supposed to combine the tonic effects of zinc with the sedative action of the bromides.

Ferrous Bromide is not official. It is supposed to combine the actions of iron and the bromides, and to produce the effects of a sedative chalybeate tonic. It is not an eligible chalybeate.

THERAPEUTICS.

The Bromides are used as sedatives to the nervous system, to lower reflex activity, to produce sleep, to subdue excitement of the genital apparatus, and to antagonize cerebral excitement when not inflammatory in character. In epilepsy their power of lowering the excitability of the cerebral cortex makes them the most valuable remedies for diminishing the number of the attacks, though they rarely cure the disease. They are greatly abused in many instances, and should usually be restricted to those cases in which motor irritability is more marked than psychic irritability, and where the disease is not due to gross organic lesions. They should not be used in anemic or adynamic cases, and should never be continued for any length of time without the daily supervision of a competent physician. Their dosage in this disease is usually much heavier than is necessary, instead of 40 to 60 grains and more thrice daily, less than one-half these quantities give equally good results, particularly

if sodium chloride is withdrawn from the food, as the bromides act more efficiently in the absence of the chlorides. If opium be administered for 4 to 6 weeks before a course of bromide treatment the latter will be more effective in smaller doses than otherwise. In various forms of insanity they are largely used, often to the detriment of the patient, causing a degree of mental dulness which simulates dementia, lowering nutrition and checking recovery. As hypnotics they are valuable in the insomnia of overwork or worry, in nightmare and the night-screaming of children, and when there is no organic reason for the wakefulness, but they are useless in cases due to pain, and in delirium tremens. They are efficiently palliative in many spasmodic affections, as laryngismus stridulus and whooping-cough, also for the nervous symptoms of the climacteric period, and those complicating uterine disease. Tetanus has been cured by large doses of the bromides, and in strychnine poisoning they have proved efficient as antagonists, though too slow of action to be of much practical service. In diabetes of nervous origin, the Ammonium salt, long used, has proved curative by its sedative influence on the medulla; and in acute rheumatism it is an excellent alkali. In muscular rheumatism, rheumatic arthritis and myalgia, also in the uric acid diathesis and various affections due to undeveloped gout, the Lithium salt gives good results. Bromides are often very efficient in migraine, neuralgia, and hysteria, nervous erethism, infantile colic, cholera infantum, vomiting of cerebral origin, sea-sickness, cardiac irritability not due to anemia and other varieties of functional disease of the heart, seminal losses when plethora exists, and nymphomania. The Potassium salt is, by some writers, considered almost specific in subinvolution of the womb, also in uterine hemorrhage not due to a mechanical cause.

Strontium Bromide is favorably known for its beneficial action in gastric affections, particularly in dyspepsia, acetic and lactic fermentation, flatulence from decomposition and vomiting of various origin, including the vomiting of pregnancy. In severe cases of the latter affection it proved entirely successful, administered in doses of gr. xv with meals, twice daily for a month. In epilepsy it has been employed with advantage, in doses of gr. xx thrice daily, gradually increased: and it has been used in the treatment of nervous and sick headaches, sea-sickness, insomnia and other conditions for which the bromides are considered suitable. It is said to be less productive of the bromic acne than any other bromide in general use.

The Syrup of Iron Bromide has been reported by some observers as very efficient in chorea, and its usefulness therein is as strenuously denied by others. Hydrobromic Acid has been useful in hysteria, congestive headaches, neuralgia, and tinnitus aurium. It is considered less depressant than the bromides of potassium and of sodium, and is recommended as a substitute for those salts. Fothergill used it with benefit in reflex and spasmodic coughs, and in the cerebral disturbance of simple continued fever. Used as a solvent for quinine it retards cinchonism, and prevents the headache due to the full action of quinine and iron.

The Bromides should be administered in plenty of water, two or three times a day after meals, and when given for any length of time Arsenic should be conjoined with them to prevent the bromic acne, and an occasional purgative to prevent accumulation. The mixture of Potassium Bromide and Chloral, so much used in alcoholism, is dangerous in cases of weak or fatty heart, both drugs being active cardiac depressants.

Bromipin may be administered for a long time, it is said, without irritating the stomach, impairing the appetite, or producing bromism. It is highly praised by those who have used it, as supplying all the therapeutic efficacy of the bromides, with few or none of their drawbacks.

Bromine is not much used in medicine. It is the most efficient escharotic for chancre and hospital gangrene, and its vapor inhaled from hot water is useful in acute coryza and hay-fever. A solution of 8 minims to the ounce, used internally in doses of mj-ijj every half-hour, together with inhalation of the vapor, has been successfully employed in severe cases of laryngeal diphtheria.

Bromoform is an analogue of Chloroform, its inhalation producing anesthesia of brief duration. Overdoses internally have caused deep narcosis in children tempted by its agreeable taste to the surreptitious ingestion of a greater than the prescribed quantity. It is an efficient palliative in whooping-cough, administered in daily doses of 5 to 20 minims in glycerin and alcohol solution. It aborts the paroxysms of coughing and reduces their number, but has little influence otherwise on the regular course of the affection. Increasing doses must not be pushed very far for fear of toxic symptoms, and the drug must be absolutely colorless if pure. Inhalations of Bromoform have been used with some success in the treatment of diphtheria, and it has been employed locally with benefit, as a deodorizer, disinfectant and analgesic, in ozena and in tuberculous and other ulcers of the larynx.

BRYONIA, Bryonia, Bryony (Unofficial),—is the root of *Bryonia alba* and of *Bryonia dioica*, European perennial plants of the nat. ord. Cucurbitaceæ. Its taste is acrid and bitter, but it is inodorous. The active principle is the glucoside *Bryonin*, $C_{48}H_{80}O_{19}$, which is intensely bitter, and soluble in water and in alcohol, but insoluble in ether. Dose, of the powdered root, gr. x-xxx.

Preparations.

Tinctura Bryoniæ, Tincture of Bryonia (Unofficial),—a 10 per cent. solution of the root in alcohol. Dose, ℥v-ʒss.

Bryonin (Unofficial),—is a violent poison in doses of from 3 to 4 grains. Dose, as a drastic purgative, gr. $\frac{1}{4}$ - $\frac{1}{2}$.

PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Bryonia is a pure irritant, setting up local inflammation wherever applied, with febrile phenomena. It has a vesicant action on the skin, and is violently irritant to the serous and mucous membranes. Taken internally, it has caused fatal gastritis; introduced into the pleura, fatal pleuritis has resulted with fibrinous effusion. It has a specific determination to serous and synovial mem-

branes, especially the pleuræ, and is irritant to muscular fibre and to the bronchial mucous membrane, causing dry, continuous, shaking cough, with soreness behind the sternum. It produces cerebral congestion, with frontal headache, vertigo and epistaxis; also hepatic and renal congestion, burning pain and tenderness in the hepatic region with bilious disturbance amounting sometimes to severe jaundice, vesical tenesmus, and depression of the action of the heart. It is a drastic purgative and a powerful diuretic.

Bryonia is a very old medicine, its most ancient reputation having been in epilepsy, hysteria and mania, conditions in which it is now superseded by other agents. It is a most valuable drug in the second stage of serous inflammations, after Aconite has reduced the pyrexia, especially in pleurisy, pleuro-pneumonia and pericarditis, to limit the extent of the effusion and to promote its absorption. For this purpose small doses frequently repeated are required. Also, in rheumatic fever, after the swelling of the joints has been reduced by other means, Bryonia is extremely efficient for the pain and stiffness. It is one of the best remedies for a "cold-on-the-chest," with dry, shaking cough, soreness, or shooting pains. It has been used with success in common, continued or "gastric" fever, relapsing fever, congestive headaches increased by stooping, bilious headache with vomiting, gastralgia with pyrosis and soreness of the epigastrium, constipation, cholera infantum during dry, hot weather, congestion of the liver, croup, and threatened mammitis. Pains of shooting or tearing character, increased by movement, are often quickly relieved by this drug. In dropsies it is used as a drastic purgative and diuretic to remove the accumulated fluid.

BUCHU, Buchu,—is the dried leaves of *Barosma betulina*, a S. African shrub of the nat. order Rutaceæ. They contain a *Volatile Oil*, which is probably the active principle, and gives them a peculiar and penetrating odor, resembling that of peppermint; also *Barosmin*, a bitter extractive, and resin, gum, lignin, etc. Dose, of the leaves, gr. xv–xl [av. gr. xxx.]

Preparations.

Fluidextractum Buchu, *Fluidextract of Buchu*,—Dose, ℥xv–xl [av. ℥xxx.]
Infusum Buchu, *Infusion of Buchu* (Unofficial),—℥j to the pint. Dose, ℥ss–ij.
Incompatible with Buchu are: Ferrous Sulphate, Infusion of Galls.

PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Buchu in small doses causes a sense of heat in the stomach, which is gradually diffused over the body. It increases the pulse-rate, stimulates the appetite, and produces slight moisture of the skin. It increases the flow of urine which becomes of darker color and strongly aromatic odor, and deposits a brownish sediment. In large doses it causes vomiting, purging and strangury, with a burning sensation at the stomach.

Buchu is of especial value in chronic affections of the genito-urinary mucous

membrane, on which the volatile oil acts topically, being eliminated by the kidneys. It is a useful remedy in pyelitis, cystitis and urethritis; also in lithiasis, in chronic bronchitis, and in affections of the prostate gland. It is recommended in atonic dyspepsia, chronic rheumatism and affections of the skin, also for dropsy, but it is not so actively diuretic as to be very efficient in the latter condition.

The Infusion makes an excellent vehicle for saline diuretics.

CACTUS GRANDIFLORUS, *Night-blooming Cereus* (Unofficial),—is a native of tropical America, and has long had a local reputation as a remedy for dropsy, but was brought into notice as a cardiac remedy by Dr. Rudini. Its active principle, *Cactine*, a supposed alkaloid, has been physiologically studied by Dr. Myers, who finds it possessed of very decided stimulant action upon the heart, the arterial tension and the spinal motor centres. Therapeutically, this drug has been employed as a cardiac stimulant in the functional disorders of the heart connected with anemia, neurasthenia, dyspepsia, tobacco-poisoning, exophthalmos, sexual exhaustion and low fevers, also in pseudo angina pectoris. It does not prolong the diastole, as Digitalis does, and on this account it has been especially recommended in complicated aortic regurgitation. A tincture is prepared, ℥iv of the fresh stems to a pint of strong alcohol, the dose of which is ℥xx–xxx every 4 hours. Dose of Cactine, gr. $\frac{1}{100}$ – $\frac{1}{30}$, three or four times a day.

Pellotine, $C_{12}H_{16}NO_2$ (Unofficial),—is an alkaloid obtained from *Anhalonium Williamsii*, a member of the cactus family growing in Mexico. This alkaloid is a powerful hypnotic and also somewhat analgesic, though not possessing the pain-relieving power of morphine. It has the advantage of being capable of hypodermic administration, and has given relief to the pains of locomotor ataxia and peripheral neuritis. The dose is about gr. j for an adult. *Mezcaline*, another alkaloid, seems to be the cause of the exaltation produced by drinking the fermented liquor Mezcal prepared from this plant.

CADMIUM, Cd.,—in its physiological action resembles both Antimony and Zinc, its salts being escharotic, astringent, depressant, and emetic; in overdoses acting as irritant poisons, with cerebro-spinal symptoms such as convulsions and coma. They are never used internally, but for external employment the important ones are—

Cadmii Sulphas, *Cadmium Sulphate* (Unofficial),—transparent oblique prisms, efflorescent, and very soluble in water. Used externally in a solution of gr. ss–iv ad ℥j aq. destil., or as an ointment (1 to 40 of fresh lard).

Cadmii Iodidum, *Cadmium Iodide* (Unofficial),—large, white, pearly crystals, soluble in water and alcohol. Used as an ointment, 1 to 8 of lard.

The Sulphate has been used almost exclusively as a stimulating astringent in gonorrhœa and conjunctivitis. Corneal opacities are absorbed under the use of a solution of gr. ij to the ℥, and in gonorrhœa a mild injection (gr. $\frac{1}{4}$ ad ℥j) is very beneficial. An ointment of the Iodide has been usefully employed for enlarged glands, chronic joint affections, cutaneous diseases, nodes and chilblains. Alkalies, Carbonates, Chromates, Phosphates, and Sulphides, are incompatible with the soluble Cadmium salts.

CAFFEINA, Caffeine, (*Theine, Trimethyl-xanthine*) $C_8H_{10}N_4O_2 + H_2O$,—is a feebly basic proximate principle, obtained from the dried seeds of *Coffea arabica*, or the dry leaves of *Thea sinensis*, and found also in other plants. It occurs in colorless, silky crystals, which are soluble in 80 of water and in 33 of alcohol. The commercial Caffeine is usually obtained from old tea leaves. It contains more nitrogen than almost any other vegetable principle. Dose, gr. ss–iij [av. gr. j]. Caffeine is an ingredient of the Compound Powder of Acetanilide (see page 59).

The coffee-plant is a small tree of the nat. ord. Rubiaceæ, 15 to 30 feet high, native of Arabia and Abyssinia, but cultivated in various parts of the world. Its seeds contain the alkaloid *Caffeine* (partly free, partly as a tannate), also

tannic and caffeic acids, sugar, legumin, etc. By roasting them, part of the caffeic acid is converted into methylamin, the sugar is changed into caramel, and several volatile substances are formed, which give to coffee its peculiar aroma and some of its stimulant qualities, and are collectively known as *Caffeone*, one of them being called *Caffeol*.

Allied Plants are—*Thea sinensis*, the tea-plant, which contains Caffeine and Theophylline; *Theobroma cacao*, containing Theobromine, a principle allied closely to caffeine; *Sterculia acuminata*, the Kola-plant, the nut of which contains Caffeine and small quantities of Theobromine; *Paullinia sorbilis*, the seeds of which (Guarana) contain Caffeine and Theobromine; *Ilex Paraguayensis* (Mate) contains a very small quantity of Caffeine; *Erythroxylon Coca*, contains the alkaloid Cocaine, which is allied to caffeine in action, but is more powerful.

Theobromine, *Dimethyl-xanthine*, $C_7H_8N_4O_2$,—is closely allied to caffeine, both chemically and physiologically.

Theophylline, *Dimethyl-xanthine*, $C_7H_8N_4O_2$,—is isomeric with theobromine, differing only in the arrangement of its formula and in some of its reactions.

These bodies are derivatives of *Xanthine*, $C_5H_4N_4O_2$, which occurs as a waste product of metabolism in muscles and other organs, and appears also in urine and feces.

Preparations.

Caffeina Citrata, *Citrated Caffeine*,—is a very uncertain mixture, and is not considered to be a definite compound. It is prepared by dissolving equal weights of Caffeine and Citric Acid in double the quantity of hot distilled water, evaporating the solution to dryness and powdering the product, which is white, odorless, of acid taste and acid reaction, soluble in about 3 parts of water, precipitated as Caffeine on further dilution with water, and redissolved with about 25 parts of water. Dose, gr. j-v [av. gr. ij.]

Caffeina Citrata Effervescens, *Effervescent Citrated Caffeine*,—composed of Caffeine 4, Citric Acid 19½, Sodium Bicarbonate 57, Tartaric Acid 30, triturated, dried and powdered. Dose, gr. xxx-5jss [av. 3j.], in a glassful of water, as an effervescing drink.

Fluidextractum Coffeæ Viridis (Squibb), *Fluidextract of Green Coffee* (Unofficial),—is intended as a substitute for the fluid extract of Guarana. Dose, ʒss-ij.

Analogues of Coffea.

Guarana,—is a dried paste consisting chiefly of the crushed seeds of *Paullinia Cupana*, a climbing plant of the nat. ord. Sapindaceæ, growing in Brazil. It occurs in brown cakes or sticks, having an odor of chocolate, and a bitter, astringent taste, partly soluble in water and in alcohol. It contains *Caffeine* and *Theobromine*, also tannic acid, gum, albumin, starch, and a fixed oil. The specimens found in commerce are untrustworthy, unequal in quality and expensive (Squibb). Dose, gr. xv-xlv [av. gr. xxx.]

Fluidextractum Guaranae, *Fluidextract of Guarana*,—is made with Diluted Alcohol. Dose, ʒxv-xlv [av. ʒxxx.]

Diuretin, *Sodio-theobromine Salicylate* (Unofficial),—occurs as a colorless powder, of sweetish, saline and alkaline taste, soluble in ½ its weight of water, and should contain 46½ per cent. of Theobromine. Being a very unstable compound, it should not be prescribed in combination with other drugs, and when dispensed it should be well sealed from contact with the air, from which it rapidly absorbs carbonic acid, thereby undergoing decomposition. If ordered under its chemical name the cost should be less than ½ that of the same article under its proprietary title (Squibb). Dose, gr. x-xv, in powder or aqueous solution, several times a day, as a diuretic.

Agurin (Unofficial),—is a combination of Sodium Acetate and Sodium Theobromate, and is said to contain 60 per cent. of Theobromine. It occurs as a colorless and odorless powder, of alkaline reaction, soluble in water. Dose, gr. v-xv or more, thrice daily in wafers, as a diuretic.

Theocin (Unofficial),—is the trade-name of Theophylline (see above), and occurs as a white, crystalline powder, soluble in 180 of cold water and in 85 of water at 100° F. Dose, gr. iv, thrice daily, as a diuretic.

Incompatibles.

Incompatible with *Caffeine* are: the same substances as for the alkaloids generally (see page 6). Physiologically incompatible are Chloral Hydrate, Morphine, Physostigmine.

Incompatible with *Diuretin* are: Acids, Bicarbonates, Borates, Chloral Hydrate, Ferric Chloride, Phosphates, Phenol, Phosphoric Acid, also the incompatibles for salicylates (see under SALICINUM).

PHYSIOLOGICAL ACTION.

Caffeine is in general terms at first a stimulant and subsequently a paralyzant to the nerve-centres in the cerebrum, medulla and cord. In small doses it quickens the action of the heart and raises arterial tension; stimulates the cerebral functions, by increasing the supply of blood to the brain; and increases the respiration rate and the secretion of urine. Larger doses (gr. v-vij) often over-stimulate the cerebral circulation, causing great heaviness of the head, flashes of light before the eyes, tinnitus aurium, insomnia, restlessness, and even delirium, the pulse becoming rapid, feeble, irregular and intermittent, and the general body-temperature elevated, though that of the periphery may be lowered. Large doses depress the heart and respiration, and lower the blood-pressure; in the smaller animals it exalts the reflex excitability of the cord, producing tetanic convulsions, and in lethal doses paralyzes the cardiac muscle as well as its motor ganglia, but causing death by paralysis of respiration. It powerfully affects muscular fibre, both voluntary and involuntary kinds, throwing it into a state of tetanic contraction resembling rigor mortis. Caffeine is a reliable hydragogue diuretic, acting by stimulation of the secreting apparatus in the kidney, as well as by generally raising the arterial tension (Brunton). The action of caffeine on the kidneys is two-fold; during the first stage it causes a fall of general blood-pressure and constriction of the renal vessels; during the second stage, which persists much longer than the first, the blood-pressure returns to its normal height and the kidney undergoes great expansion (Murrell). If administered in sufficient quantity it would doubtless prove fatal to man, but its lethal dose for him would be large. Zenetz has recently published the details of three cases of sudden death during the use of full doses of caffeine, in all of which the heart was found at the autopsy to be so firmly contracted that it was cut with difficulty. He infers therefrom that caffeine may cause sudden arrest of the heart in systole.

Caffeine is excreted as such very slightly and slowly by the kidneys. In its passage through the body it largely loses its methyl groups, most of it being transformed into xanthine, which probably breaks up into urea.

Theobromine and Theophylline act similarly to Caffeine on the kidneys, heart, and muscular tissue, but have little effect on the central nervous system. In large doses Theobromine is fatal to small animals.

Coffee is a cerebro-spinal stimulant, a stomachic tonic, and a laxative. It is decidedly diuretic, and is somewhat antiperiodic. The green bean produces very different effects from those of the roasted one, exhibiting the action of Caffeine alone, unmodified by that of the empyreumatic products. A tincture of green coffee, besides being an efficient diuretic, has marked anti-lithic powers, and promotes the elimination of the poison of gout from the system. Coffee when freshly roasted and ground is deodorant, antiseptic, and germicidal, an infusion of ½ per cent. inhibiting the growth of many pathogenic organisms, and those of 10 per cent. killing anthrax bacilli in 3 hours, cholera spirilla in

4 hours, and other bacteria in 2 to 6 days. Infusions of green coffee do not possess this antiseptic action, which is probably due to the empyreumatic products developed by the process of roasting.

As a beverage, if used with moderation Coffee assists digestion, promotes intestinal peristalsis, allays the senses of fatigue and hunger, lessens tissue-waste and consequently decreases the formation and excretion of urea. Used to excess it disorders digestion, and causes functional disturbances of the nervous system, shown by headache, vertigo, mental confusion, and palpitation of the heart. It increases secretion, blunts sensation, exalts reflex excitability, increases mental activity, and may produce insomnia and great nervous restlessness. It first briefly stimulates the heart and raises arterial tension, but soon depresses both. The wakefulness is usually preceded by a short period of drowsiness.

The brief stimulation of the intellect, consequent on drinking a cup of good coffee, cannot be obtained from an infusion of raw coffee, and is probably due to the volatile constituents developed in roasting. *Caffeone* opposes Caffeine in its action on the circulation, as it quickens the pulse and lowers arterial tension. Its action, however, is of brief duration, and soon gives way to the influence of the principal constituent. The *Tannin* is the ingredient which enables it to produce dyspepsia, and is most abundant in those infusions which are kept a long time on the stove before being served.

Tea (*Thea sinensis*, nat. ord. Ternstroemiaceæ), is one of the most refreshing and stimulating members of the group. Used to excess, it powerfully affects the stability of the motor and the vaso-motor nerves, the action of the heart, and the digestive function, producing flatulent dyspepsia, tremulousness of the limbs, pallor of the surface, irregular cardiac action and feeble impulse, hallucinations, nightmare, anorexia, headache, nausea and vomiting, obstinate neuralgia, especially of the supra-orbital and occipital nerves; also constipation and a pain in the left side are not infrequent. The condition of chronic tea-poisoning is termed *Theism*, and is very often seen among women of the lower class in cities, who do not indulge in alcoholic beverages, but freely accept the dominion of the "cup that cheers" and worse than inebriates. Tea contains much more tannin than coffee, and that used as a beverage by the poorer classes is little more than a decoction of tannin, and a fruitful source of dyspepsia and other forms of gastric disorder.

Cocoa (*Theobroma Cacao*, the Chocolate-tree, nat. order Sterculiaceæ), pronounced *Ko-ko*,—is more nutritious than any other of the group, containing a large quantity of fat, *Oleum Theobromatis* (cacao-butter), which makes it difficult of digestion to many persons. The various preparations of this agent are made from the seeds, after the oil has been expressed from them. They are ground in a mill, mixed with rice, barley, sugar, flour, etc., and put up in powdered form, called *Cocoa*,—but when flavored with vanilla and pressed into a cake the product is named *Chocolate*. The thin husks which envelop the seeds

are known as *Shells*, and are used to make a beverage similar to but milder than cocoa or chocolate. [Compare the article entitled *THEOBROMATIS OLEUM*.]

Coca, or Cuca (*Erythroxylon Coca*, nat. ord. Lineæ), is probably more sustaining than either tea or coffee and less of a direct stimulant, at least as used by the Peruvian natives. Its habitual and excessive use produces a very serious train of nervous symptoms. [Compare the article entitled *COCA*.] Its alkaloid, *Cocaine*, is allied in action to Caffeine, but is more powerful, and its proportion in the leaves of the plant varies greatly in the different samples which occur in commerce.

Kola (*Cola acuminata*, nat. ord. Sterculiaceæ), is the nut or seed of the Kola plant, a handsome tree growing 30 to 60 feet high in the tropical forests of Africa and in the West Indies. It contains both *Caffeine* and *Theobromine*, the former in larger proportion than any member of the group except Guarana; also *Tannic Acid* and a glucoside substance named *Kolanin*, which, in the presence of a ferment, splits up into free caffeine and glucose, its yield of caffeine being 3 per cent. The Kola nut is highly valued by the negroes as a stimulant beverage and food and as an aphrodisiac, the latter quality being ascribed to the essential oil, which is not present in the dried nuts. It improves the appetite and the digestion, and promotes cheerfulness of the spirits and inclination to exertion. It is becoming a fashionable stimulant under the commercial methods which are employed in pushing the sale of the various preparations on the market.

Guarana (*Paullinia Cupana* of Brazil, nat. ord. Sapindaceæ), contains an alkaloid—*Guaranine*, in the proportion of 5 per cent., which is identical with Caffeine. It is especially noted for relieving a nervous headache, for which purpose the official fluid extract may be used in doses of ℥xx, three or four times daily, when the basis of that preparation happens to be of good quality.

Maté (*Ilex Paraguayensis*, nat. ord. Aquifoliaceæ), is supposed to be intermediate as to its effects between tea and coffee. It contains a very small quantity of Caffeine, about 1 per cent., also a little tannin.

The qualities possessed in common by these substances, and for which they are so universally esteemed by mankind, are three-fold. They all retard the retrograde metamorphosis of the body-tissues (tissue-waste), thereby enabling the work of the individual to be done upon a smaller supply of reparative material (food), and with less fatigue. Furthermore, when used in moderation, they are more or less stimulating to the mental processes, and sedative to the nervous system.

This similarity of action they owe to the possession of principles, which are so closely related to each other that until very recently they have been considered identical both by chemists and pharmacologists. The divergence from each other, in the finer shades of their action, depends most probably on the existence in each of differing aromatic and volatile principles, which modify the action of the alkaloid in some degree. Other principles are developed in them by the various processes of preparation (roasting, drying, etc.), which have some part in determining the general action of the beverages containing them.

THERAPEUTICS.

Although without a very extensive range of usefulness, Caffeine is a valuable stimulant in many forms of nervous and cardiac depression, and has proved especially efficacious in headaches of neuralgic or nervous type, the pain being general over the head; gr. j of Caffeine every half hour, or the fluid extract of Guarana, in 20-minim doses every 2 or 3 hours. In choleraic diarrhea, and that of phthisis, it checks outward osmosis by stimulating the depressed nervous apparatus. In cervico-brachial neuralgia, Caffeine may be used hypodermically in doses of gr. ss, increased to gr. ij. In lithemia and gout, a tincture of the green bean has marked diuretic and antispasmodic powers, and is very useful in these conditions. In the insomnia of chronic alcoholism gr. $\frac{1}{2}$ of Caffeine hypodermically is often efficient. For adynamic fevers, it may well be used in place of alcoholic stimulants. In intermittents Coffee has a curative reputation among the inhabitants of the Philippines, which is corroborated by the Dutch physicians. In asthma, Coffee is valuable for the paroxysm if not used habitually. In opium narcosis, Caffeine hypodermically, or better still, strong black coffee by the mouth, will antagonize the increasing torpor of the nervous centres.

Although Caffeine is an efficient diuretic in cardiac and renal dropsies, there are many objections to its use for this purpose. It sometimes acts as a purgative as well as a diuretic, and although at first it produces copious diuresis, tolerance is soon established and it loses its diuretic power. Moreover, it is a powerful cardiac stimulant, and in many persons it exerts a very marked excitant action upon the central nervous system. Lastly, and as a minor disqualification, it sometimes sets up considerable smarting in the penis and produces a mild form of urethritis (Murrell). Its tendency to produce tetanic contraction of muscular tissue and its possible influence to arrest the heart in systole should be kept in mind when it is being administered for any prolonged period.

Caffeine is contained in many proprietary preparations of which Acetanilide is the active ingredient (see page 60). Its office therein is that of a corrigent, to antagonize the depressant action of the latter drug upon the heart. A double citrate of caffeine and antipyrine, named *Migranin*, is described on page 141.

Kola is a useful agent in gastric catarrh and in the dyspepsia of alcoholic subjects, as an adjunct to other treatment. After an alcoholic debauch it will do much toward restoring the nervous system to its normal condition. It will counteract the depressing effects of tobacco, and has been employed with benefit in asthma of both the nervous and cardiac forms. As it contains a good deal of tannin, it is especially efficient in atonic diarrhea, and in gastro-intestinal irritation with looseness of the bowels, a restricted diet and Kola-wine are frequently all that is needed. As an aphrodisiac it deserves high rank, though it acts in this respect not so much by stimulating the sexual appetite as by enabling the organism to escape the sense of exhaustion and extreme debility which neurotic patients are apt to complain of.

Guarana is chiefly employed in the treatment of nervous sick-headache (migraine) administered in half-drachm doses of the fluid extract when the attack is developing. It has been used in the diarrhea of phthisis, in convalescence from acute diseases, and generally in conditions requiring tonic treatment.

Diuretin has been employed with marked benefit in both cardiac and renal dropsy, in hepatic cirrhosis, and in various diseases of the heart and kidneys accompanied by edema. The author has seen a large pleuritic effusion disappear rapidly under its use, the fluid having re-accumulated after having been once removed by tapping the pleural cavity. It should be administered in aqueous solution, avoiding acids or acid vegetable juices, which are chemically incompatible, as they precipitate the alkaloid in the form of a thick white sediment.

Agurin is less irritant to the stomach than Diuretin, and is equally active as a diuretic. Excellent results are recorded from its use in engorgements and dropsies of various origin, renal, hepatic, and cardiac. It is said to be an excellent antistenocardic remedy, serving to both suppress and prevent the paroxysms.

Theocin (Theophylline) has not so great a stimulant action on the heart as Caffeine, but is a much more powerful diuretic than either Caffeine or Theobromine. It may give rise to some gastric irritation, and is said to not irritate the kidneys to any harmful extent.

CAJUPUTI OLEUM, Oil of Cajuput,—is a volatile oil distilled from the leaves of *Melaleuca Leucadendron*, a tree of the nat. ord. Myrtaceæ, native of the Molucca Islands. It is a bluish-green or colorless liquid, of camphoraceous odor and neutral reaction, freely soluble in alcohol. It should yield not less than 55 per cent. by volume of *Cineol*. Dose, ℥v-x [av. ℥viiij].

Cajuput Oil resembles Oil of Turpentine, and has similar action to that of the other volatile oils, being a stimulant carminative, somewhat diuretic and diaphoretic, antiseptic, parasiticide and anthelmintic. Externally used it is irritant to the skin. Swallowed, it produces a sense of warmth in the stomach and accelerates the pulse.

It is not much used internally, though it has been given with benefit in flatulent colic, dropsy, hysteria, chronic rheumatism, scrofula, and syphilis, also in elephantiasis and other cutaneous disorders. Externally, as a strong, stimulating rubefacient, it is efficient in chilblains, muscular rheumatism and nervous headaches.

CALAMUS, Sweet Flag,—is the rhizome of *Acorus Calamus*, a plant of the nat. ord. Araceæ, native in Europe and North America, having an aromatic odor and pungent taste. Only the unpeeled root should be used, peeled or bleached calamus being almost inert. It contains a volatile oil and *Acorin*, which is a nitrogenous, bitter principle, also benzoic acid, starch, etc. Dose, gr. x-xx [av. gr. xv.]

Fluidextractum Calami, Fluidextract of Calamus,—is made with Alcohol and Water as a menstruum. Dose, ℥x-xx [av. ℥xv].

Calamus is an aromatic bitter, and a stomachic tonic, increasing the appetite and stimulating digestion. It is one of the constituents of the preparations termed "bitters," and is chewed as an appetizer.

CALCIUM, Ca,—is the metal characteristic of Lime, Chalk, and all calcareous substances, and although itself unofficial it is represented by several official salts and preparations. Lime (*Calx*) and Chalk (*Creta*) are respectively the Oxide (CaO) and the Carbonate (CaCO_3) of Calcium, the carbonate occurring in the native forms called chalk, marble, lime-stone, oyster-shells, etc., which are converted into lime by heating to full redness (calcination), thereby driving off carbonic acid and leaving the oxide behind. The latter, in this form, is known as "burnt lime" or "quicklime"; and, by the addition of $\frac{1}{2}$ to $\frac{3}{4}$ its weight of water, combines with one molecule of H_2O to form *Calcium Hydroxide*, $\text{Ca}(\text{HO})_2$, or "slaked lime," the process being termed "slaking" and being accompanied by the evolution of a high degree of heat.

Lime is one of the four alkaline earths, the other three being Baryta, Magnesia, and Strontia. As such, however, it never occurs naturally, though in combination with various acids it is found in all the three kingdoms of nature; its base, the metal Calcium, being a